

HOST SPECIFICITY OF *RHIPICEPHALUS SANGUINEUS* (LATREILLE) AND *R. SECUNDUS* FELDMAN-MUHSAM IN ISRAEL.

By B. FELDMAN-MUHSAM

Department of Parasitology, The Hebrew University,
Jerusalem, Israel.

Various authors studying the epidemiology and host relationship of *Rhipicephalus sanguineus* (Latr.), *sens. lat.*, state that this tick attacks a wide range of hosts including dogs, sheep, cattle, horses, etc. According to Hoogstraal (1954), "*R. sanguineus* is extremely common on dogs and other domestic animals everywhere in the Near East". With respect to Greece, Pantazis (1947) mentions a very large range of hosts, *i.e.*, dogs, cats, foxes, horses, sheep, goats, cattle, camels, etc. In Algeria, Sergeant & others (1945) do not specify the hosts but say that *R. sanguineus* appears in April in large numbers on farm animals. Colas-Belcour & Rageau (1951) state that in Tunisia *R. sanguineus* is to be found on dogs, cattle, goats, sheep, etc. According to Theiler (1943), *R. sanguineus* is found in Portuguese East Africa especially on dogs and occasionally on cattle and other domestic stock.

Since 1952, when it became evident that *R. sanguineus* (Latr.), 1806 is not one species but two distinct ones, *i.e.*, *R. sanguineus, sens. str.*, and *R. secundus* Feldman-Muhsam, 1952, it was thought advisable to examine large batches of ticks from different hosts in order to study any host specificity which might be found in these two closely related species. As it is possible to distinguish between the two species only by the mounted genital aperture of the female or by the larvae or nymphs, the following data will refer mainly to females. Ticks examined were from a collection of the Department of Agriculture of the Government of Palestine and from our own collection. As regards the material from the former collection, records included the date, place and host, but not the number of host animals examined. The material originates from practically all parts of Israel and the territory of the Palestine Mandate, now outside Israel, in all seasons of the years 1928-1931 and 1950-1951, and from various suspected carriers. Specimens collected at a certain place and time were considered as a batch even if taken from more than one animal of the same species.

As on every farm there is generally only one dog, but many head of cattle, sheep and goats, a batch from a dog will often include specimens from a single animal, but batches from domestic stock, specimens from many hosts.

It is evident from Table I that there is a very clear, but not absolute, host specificity of the two species. *R. sanguineus, sens. str.*, is more prevalent on dogs, and *R. secundus* on sheep, goats and cattle. This conclusion is based on the examination of more than 150 specimens from each host and the differences between respective percentages are striking. Incidentally, *R. secundus* also parasitises dogs, and *R. sanguineus, sens. str.*, cattle, sheep and goats. It may be suggested that this situation exists in other Mediterranean countries too, because in material from neighbouring countries (Turkey, Yugoslavia, Iraq and Algeria) *R. secundus* was very common. (The geographical distribution of the two species will form the subject of a subsequent publication.) Statements to the effect that *R. sanguineus* is very common on domestic animals anywhere in the Near East should be carefully re-examined.

The practical importance of these findings lies in the fact that it explains discrepancies in field records. In one instance in the same locality, cows are often covered with the alleged "*R. sanguineus*", whereas the dog is free from the "same" tick, or the contrary. This is due to the fact that cows are parasitised mainly by *R. secundus*, whereas the dog does not attract this species to the same extent.

TABLE I.

The hosts of *R. sanguineus*, sens. str., and *R. secundus* in Israel.

Host	No. of batches examined	No. of females or preimaginal stages examined		% found	
		<i>R. sanguineus</i>	<i>R. secundus</i>	<i>R. sanguineus</i>	<i>R. secundus</i>
Dog	36	124	29	81	19
Cattle .. .	44	8	229	3	97
Sheep .. .	39	9	150	6	94
Goat .. .	38	18	174	9	91
Horse .. .	11	4	32	11	89
Donkey .. .	10	6	22	21	79
Jackal .. .	10	10	22	31	69
Hedgehog ..	19	11	30	27	73

The figures relative to horse, donkey, jackal and hedgehog are small and therefore cannot be considered conclusive.

It might also be concluded that *R. secundus* is much more prevalent in Israel than *R. sanguineus*.

It is obvious that all experiments relating to transmission of disease by alleged *R. sanguineus* should be reevaluated, and it should be determined whether diseases such as Q fever, fièvre boutonneuse, anaplasmosis, etc., which hitherto were considered to be transmitted by *R. sanguineus*, sens. lat., are transmitted by *R. sanguineus*, sens. str., or *R. secundus*, or both species. In view of the considerable host specificity, statement of the host origin of specimens used in transmission experiments would give some indication as to whether *R. sanguineus* or *R. secundus* is the suspected transmitter. Unfortunately, authors rarely state the host origin of the material they worked with, and it is therefore impossible to comment on their results. Enigk's (1943) paper includes not only the host origin but also mentions interesting differences in the aptitude to transmit disease. Enigk refers to two different strains of *R. sanguineus*, sens. lat.; his experiments with horse piroplasmosis were carried out with material taken from a horse in Prilep, Macedonia (his strain A), and from dogs in Tripoli, North Africa (his strain B). He found that (Table 2, p. 219) when imagines of strain A were fed on a horse infected with *Nuttallia equi* and *Piroplasma caballi*, the imagines of the second generation did not infect a clean horse with either parasite, but in an experiment carried out with strain B in which nymphs were fed on the same infected animal, imagines of the first generation transmitted *N. equi* only, while imagines of the second generation transmitted *P. caballi* only. The difference in results in the experiments with the two strains are striking. It is possible that the two strains A and B with which Enigk worked did not belong to the same species. We had no opportunity of examining material from Greece and Tripoli, but in material from Yugoslavia, Turkey and Algeria we found both *R. sanguineus* and *R. secundus*, and it is therefore not improbable that strain B from the dog was *R. sanguineus*, sens. str., and strain A from the horse, *R. secundus*.

Summary.

The host specificity of *R. sanguineus* (Latr.), 1806, *sens. str.*, and *R. secundus* Feldman-Muhsam, 1952, in Israel was studied.

It was found that 81 per cent. of *R. sanguineus, sens. lat.*, found on the dog was *R. sanguineus, sens. str.*, and 19 per cent. *R. secundus*, whereas on cattle, sheep and goats, 97, 94 and 91 per cent., respectively, were *R. secundus* and the remainder *R. sanguineus, sens. str.*

It is suggested that this situation exists also in other countries in the Near East, since *R. secundus* was very common in material from Algeria, Turkey, Yugoslavia and Iraq.

The problem of transmission of disease by *R. sanguineus, sens. lat.*, should be re-investigated in the light of recent taxonomic data.

References.

- COLAS-BELCOUR, J. & RAGEAU, J. (1951). Tiques de Tunisie: Ixodines.—Arch. Inst. Pasteur Maroc, **4**, pp. 360–367.
- ENIGK, K. (1943). Die Überträger der Pferdepiroplasmose, ihre Verbreitung und Biologie.—Arch. wiss. prakt. Tierheilk., **78**, pp. 209–240.
- FELDMAN-MUHSAM, B. (1952). On the identity of *Rhipicephalus sanguineus* Lat.—Bull. Res. Coun. Israel, **2**, pp. 187–194.
- HOOGSTRAAL, H. (1954). Ticks (Ixodoidea) and their medical relations in the Near East.—J. Egypt. publ. Hlth Ass., **29**, pp. 1–8.
- PANTAZIS, G. P. (1947). The ticks of Greece. [*In Greek.*]—Sci. Yearb. Univ. Athens, 1946–47, pp. 71–182.
- SERGEANT, Ed., DONATIEN, A., PARROT, L. & LESTOQUARD, F. (1945). Études sur les piroplasmoses bovines.—816 pp. Algiers, Inst. Pasteur Algér.
- THEILER, G. (1943). Notes on the ticks off domestic stock from Portuguese East Africa.—55 pp. Lourenço Marques, Estaç. Anti-Malár.
-